

KABARAK



UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: ECON 415

COURSE TITLE: OPERATIONS RESEARCH II

STREAM: Y4S1

DAY: THURSDAY

TIME: 9.00 – 11.00 A.M.

DATE: 26/03/2009

INSTRUCTIONS:

- Answer questions **ONE** and any other **TWO** questions
- Begin every question on a separate page
- Show your working clearly

PLEASE TURN OVER

QUESTION ONE

a) Explain the following terms used in theory of Games

- i) A competitive game (2 marks)
- ii) Zero-Sum game (2 marks)
- iii) Pay-off matrix (2 marks)
- iv) Maximin- Minimax principle (4 marks)

b) A transportation company has three plants in Nakuru, Nairobi and Mombasa and two major distribution centers in Kisumu and Eldoret. The capacities of the three plants during the next quarter are 1000, 1500 and 1200 cars. The quarterly demands at the two distribution centers are 2300 and 1400 cars.

The trucking company in charge of transporting the cars charges 8 cents per mile per car. The transportation cost per car on different routes rounded to the closest dollar is calculated as

	Kisumu	Eldoret
Nakuru	\$80	\$215
Nairobi	\$100	\$108
Mombasa	\$102	\$68

Formulate Transportation Model (**8marks**)

- c) Describe the reasons and shortcomings of using simulation (8 marks)
- d) What is Markov Process and describe briefly how it is applied in business? (4 marks)

QUESTION TWO (20 MARKS)

a) A company employs service engineers based at various locations throughout the country to service and repair their equipment installed in customer's premises. Four requests for service have been received and the company finds that four engineers are available. The distances each of the engineers from various customers is given in the following table and the company wishes to assign engineer to customer to minimize the total distance to be traveled

		Customers			
		W	X	Y	Z
Service engineers	kimutai	25	18	23	14
	kamau	38	15	53	23
	otieno	15	17	41	30
	kioko	26	28	36	29

(6 marks)

- b) In certain region, voter registration was analyzed according to party affiliation: Democratic, Republican and others. It was found that on a year to year basis, the probability that a voter switches registration from democratic to republican is 0.1; from democratic to other is 0.1 from republican to democratic is 0.1 from republican to other is 0.1 from other to democratic is 0,3 from other to republican is 0.2
- i) find transition matrix **(3 marks)**
 - ii) What is the probability that a presently registered republican voter will be registered democratic two years from now **(6 marks)**
 - iii) If 40% of the present voters are democratic and 40% are republican, what percentage can be expected to be republican one year from now **(5marks)**

QUESTION THREE (20 MARKS)

- a) Using the following information determine the optimum strategies and the value of the 2 by 5 game whose pay-off table is given below

		Strategies for Y					
		y_1	y_2	y_3	y_4	y_5	
Strategies for X	x_1	3	6	-3	0	-1	(12 marks)
	x_2	2	3	-1	2	4	

- c) Explain the following terms used in assignment process
- i) Assignment process **(2 marks)**
 - ii) Origin **(2 marks)**
 - iii) Destination **(2 marks)**
 - iv) Stepping Stone method **(2 marks)**

QUESTION FOUR (20 MARKS)

- a) Given the following transportation problem

Origin	Destination			Supply
	1	2	3	
1	8	6	10	125
2	4	9	8	150
3	7	6	5	95
Demand	110	85	175	

- i) Use north west corner method to determine an initial solution (5 marks)
- ii) Proceed on to solve for the optimal solution using a stepping stone algorithm (15 marks)

QUESTION FIVE (20 MARKS)

- a) All effective simulations require a great deal of planning and organization. Although simulations vary in complexity from situation to situation. Outline general steps required for a simulation process (4 marks)

- b) A leading dealer of consumer durables is planning to apply scientific inventory policies so as to minimize the investments in stocks. Using ABC analysis we could identify items which require scientific control. One such item is “fan” whose daily demand is random and unstable. However, past sales records indicate that the pattern of daily demand does conform to fairly stable probability distribution and the same is given by

Daily demand (units)	4	5	6	7	8	9	10	11	12
Probability	0.06	0.14	0.18	0.17	0.16	0.12	0.08	0.06	0.03

The dealer finds from his past experience that the lead time from placement of an order to receiving deliveries is almost fixed and it is 5 days. An inventory policy is specified by two parameters, the reorder point and the order quantity i.e at what level of existing inventory an order should be placed and the number of units to be ordered. Using simulation technique, study the implications of inventory policy of ordering 50 units whenever the inventory at the end of the day is 40 units. You may assume that the inventory on hand at the beginning of the process is 75 units and run the simulation for 25 days

(14 marks).